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SCHOOL OF LAW

Interdisciplinary Environmental Clinic

May 29, 2015

Ms. Patricia Maliro
Chief, Air Quality Monitoring Unit
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P.O. Box 176
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Via email to patricia.maliro@dnr.mo.gov

Re: Comments on Ameren Missouri's Analysis of SO_2 and Meteorological Monitoring Stations Around Its Rush Island Energy Center

Dear Ms. Maliro:

On behalf of the Sierra Club, we submit the following comments on the report by Ameren Missouri titled Analysis of SO_2 and Meteorological Monitoring Stations Around Ameren Missouri's Rush Island Energy Center (Ameren's Monitoring Stations Analysis), which it submitted to DNR on or about April 29, 2015. The report describes the methodology Ameren used to determine the locations of three proposed ambient SO_2 monitoring stations and one meteorological monitoring station around its Rush Island Energy Center in Jefferson County, Missouri. Pursuant to a March 23, 2015 Consent Agreement with DNR, Ameren is required to install and begin operation of an SO_2 monitoring network around the Rush Island plant on or before December 31, 2015.

We believe Ameren's proposed monitoring sites should be rejected because they are located outside areas where peak 1-hour SO_2 concentrations are expected to occur based on the modeling described in Ameren's report. Furthermore, the modeling described in the report does not comport with EPA guidance on characterizing ambient air quality in areas around or impacted by significant SO_2 emission sources such as the Rush Island Energy Center and therefore may have failed to correctly identify areas of expected ambient, ground-level SO_2 concentration maxima. We also have concerns regarding the appropriateness of the meteorological data used in the modeling.

I. Based on the Modeling Described in Ameren's Report, the Proposed Monitoring Sites are Located Outside Areas Where Peak 1-Hour SO_2 Concentrations are Expected to Occur

The Consent Agreement (Appendix 1, ¶b) requires that "the number and location of SO_2 monitors and meteorological station(s) shall ensure that the approved SO_2 monitoring network represents ambient air quality in areas of maximum SO_2 impact from the Rush Island Energy Center." Ameren's Monitoring Stations Analysis (p. 3) describes the modeling it performed to

"delineate areas where maximum concentrations are expected to occur for this type of source and thus where SO_2 monitoring systems should be placed."

Unfortunately, the monitoring sites proposed by Ameren are not, in fact, located in "areas of maximum SO_2 impact from the Rush Island Energy Center," as required by the Consent Agreement.

Figures 1 through 4 below show the results of Ameren's modeling, which we derived using model input files provided by DNR. Figure 1 shows modeled SO_2 design values in the vicinity of the plant; Figure 2 shows receptors with modeled design values greater than or equal to 75 percent of the maximum modeled design value (146.1 ug/m^3); Figure 3 shows the number of times the model-derived maximum daily 1-hour concentration exceeded 75 percent of the maximum modeled design value at each receptor; and Figure 4 shows the receptors with the top 200, 100, 25, and 10 modeled design values. The locations of the plant and the proposed Fults, Natchez, and Weaver-AA SO_2 monitoring stations and the proposed Tall Tower meteorological monitoring station are shown on all figures for reference.

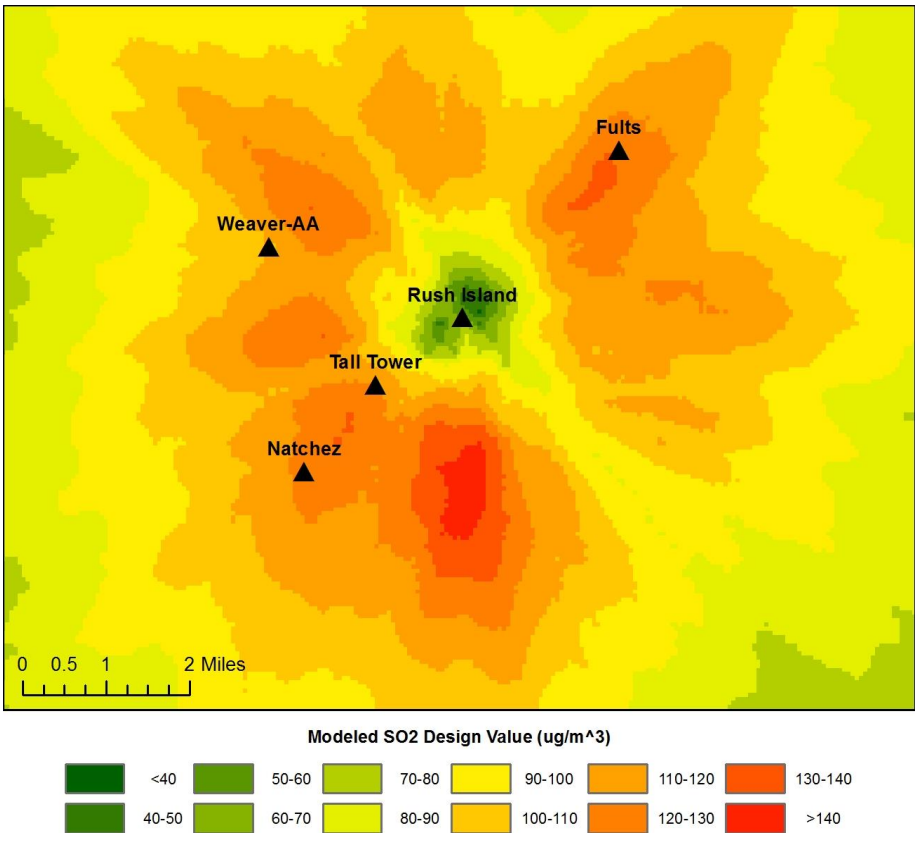

Figure 1. Modeled SO_2 design values in the vicinity of the Rush Island Energy Center.

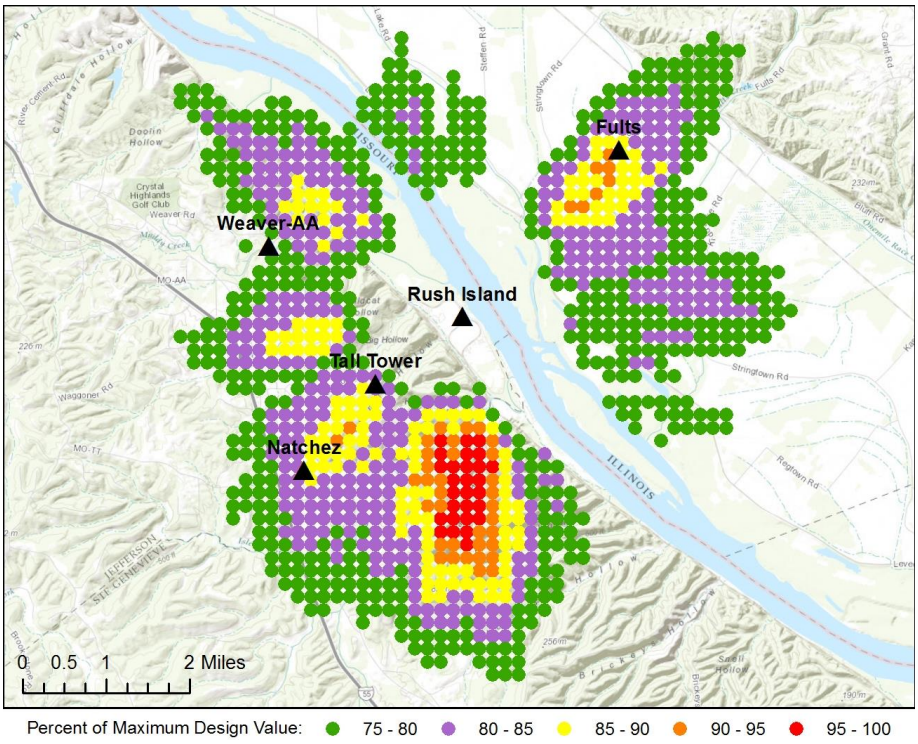

Figure 2. Receptors with modeled design values ≥75 percent of the maximum modeled design value.

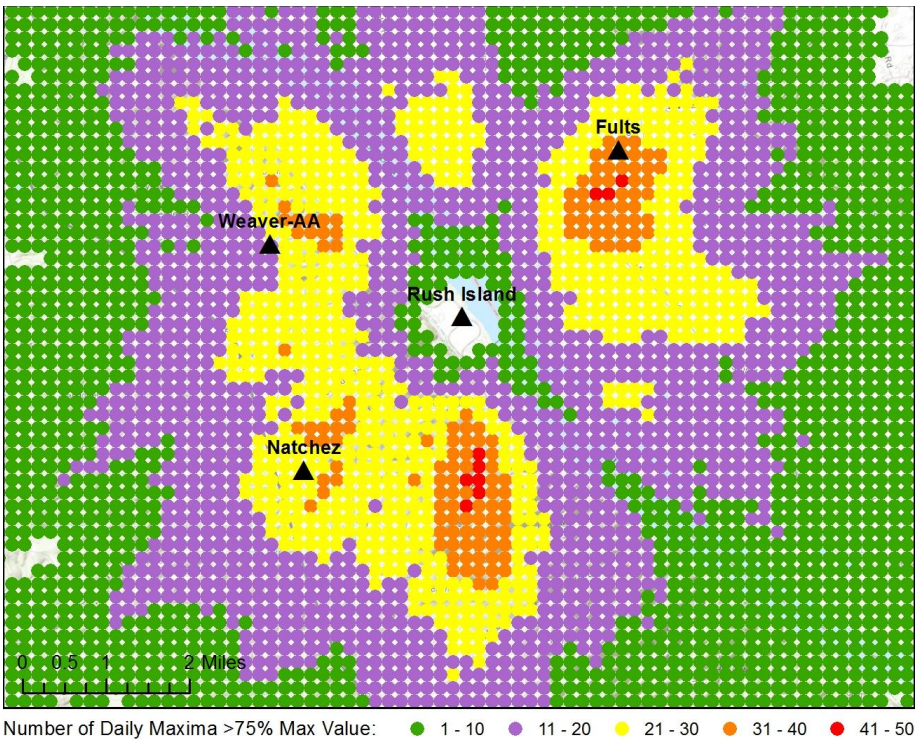

Figure 3. Number of maximum daily 1-hour concentrations ≥75 percent of the maximum modeled design value.

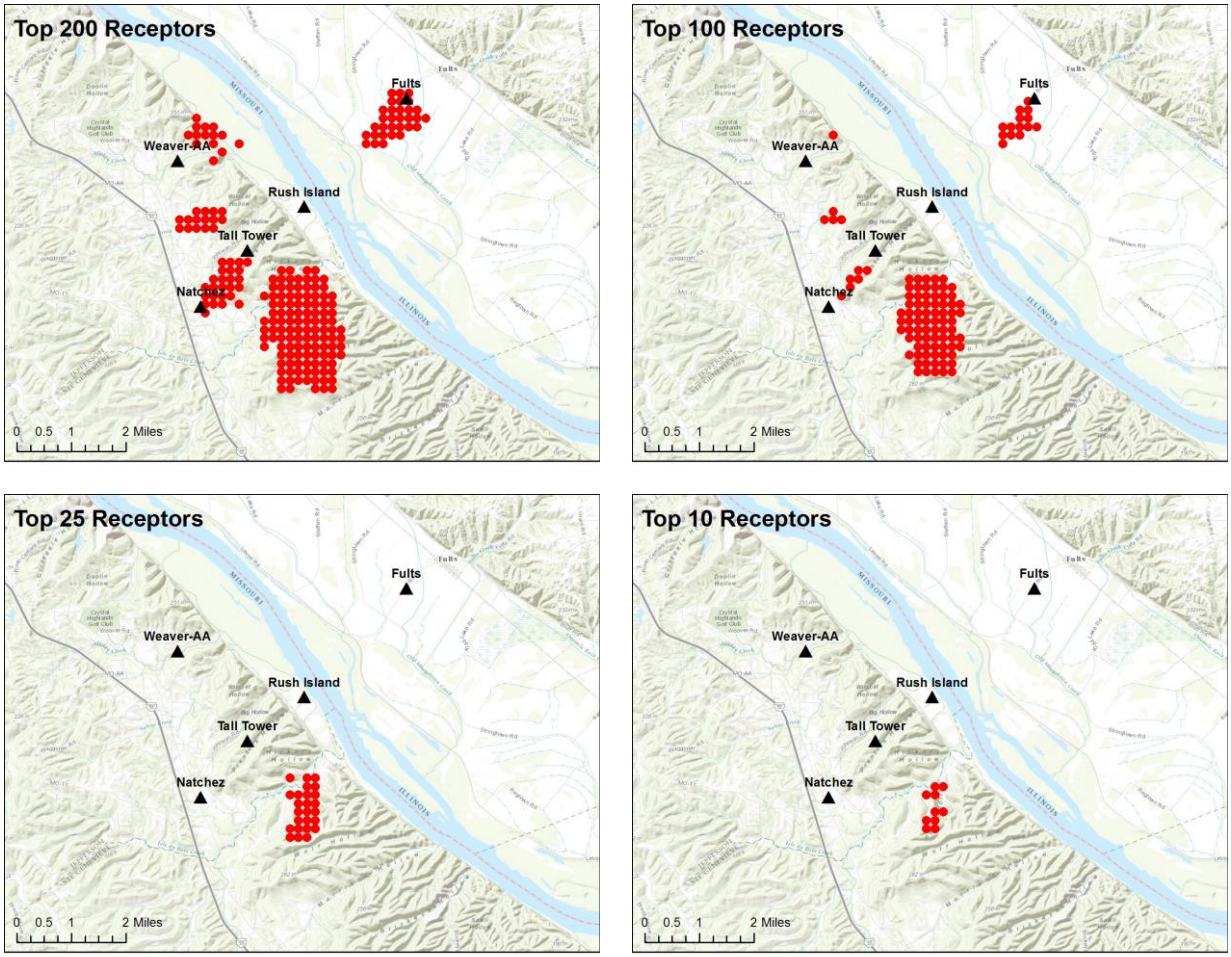

Figure 4. Receptors with the top 200, 100, 25, and 10 modeled design values.

Figures 1 through 4 all reveal a strikingly similar pattern regarding the areas where peak 1-hour SO_2 concentrations are expected to occur around the Rush Island Energy Center. There is a large area due south of the plant where modeled design values are the highest (in excess of 95 percent of the maximum modeled design value), where modeled maximum daily 1-hour concentrations frequently exceeded 75 percent of the maximum modeled design value, and where over half of the top 200 receptors (including all of the top 25 and three quarters of the top 100) are located. There are also four other areas where modeled design values are slightly lower but still very high (in excess of 85 percent of the maximum modeled design value), where modeled maximum daily 1-hour concentrations frequently exceeded 75 percent of the maximum modeled design value, and where the rest of the top 200 receptors are located. These four areas, located northeast, northwest, west, and southwest of the plant, plus the area south of the plant where modeled design values are the highest, are where Ameren's modeling predicts peak 1-hour SO_2 concentrations are expected to occur. Monitoring stations located in these areas would have the greatest chance of identifying peak SO_2 concentrations in ambient air, which is the primary objective of source-oriented monitoring and an absolute necessity when monitoring to assess

compliance with the NAAQS. However, none of Ameren's proposed monitoring stations is located in any of these areas of highest expected concentrations.

The most glaring omission is that there is no proposed monitoring station in the large area of highest expected concentrations south of the plant. This omission renders the proposed monitoring network inadequate for its intended purpose of assessing compliance with the NAAQS because a) NAAQS violations are most likely to occur in this area, and b) violations could occur in this area even when concentrations are below the NAAQS in other high concentration areas, given that the modeling predicts lower SO_2 concentrations in those areas. Ameren's Monitoring Stations Analysis claims that this area is "not accessible" because it hosts an industrial plant (Holcim). The Analysis does not indicate whether Ameren sought Holcim's permission to site a monitor on the Holcim property, and does not delineate the Holcim property boundary in terms of the modeling results. In other words, it does not document the claim that this large area of maximum expected concentrations is inaccessible for monitoring. Nor does it evaluate the nearest non-Holcim site that might be available.

While we understand that the Consent Agreement between DNR and Ameren calls for monitoring, it requires that such monitoring "represents ambient air quality in areas of maximum SO_2 impact from the Rush Island Energy Center." If no monitoring site is in fact accessible in this large area of the very highest expected concentrations, then the proposed monitoring network will not fulfill Ameren's obligation under the Consent Agreement. Instead, DNR should employ modeling, which provides 360-degree coverage and can predict concentrations at otherwise-inaccessible locations, to ensure that SO_2 emissions from the Rush Island plant do not cause or contribute to NAAQS exceedances either inside or outside of the Jefferson County nonattainment area.

Furthermore, two of the proposed monitoring stations – Fults and Natchez – are located near but outside of areas of modeled peak concentration/high frequency instead of near the center of such areas, where concentrations are expected to be higher. The third proposed station – Weaver-AA – is located entirely outside of modeled peak concentration/high frequency areas. Figure 5 shows the locations of the proposed monitoring stations on a hybrid basemap comprised of Figures 1 (modeled design values) and 2 (receptors with modeled design values ≥75 percent of the maximum design value). Receptors that are among the 200 with the highest modeled design values are outlined for reference. All three monitoring stations could easily be sited in areas where higher 1-hour SO_2 concentrations are expected to occur with greater frequency, thereby increasing their chances of detecting any NAAQS exceedances that might occur around the Rush Island Energy Center. As discussed below, we urge DNR to consider these proposed optimized locations in lieu of Ameren's proposed Fults, Natchez, and Weaver-AA locations.

Fults – Of the three proposed monitoring stations, the Fults monitoring station is closest to an area where peak 1-hour SO_2 concentrations are expected to occur. However, moving the monitor less than one kilometer southwest of its current location would move it from an area with modeled design values in the 120-130 ug/m^3 range to an area with modeled design values in the 130-140 ug/m^3 range and place it near the center of a small group of receptors with modeled design values equal to 90-95 percent of the maximum modeled design value (the receptors

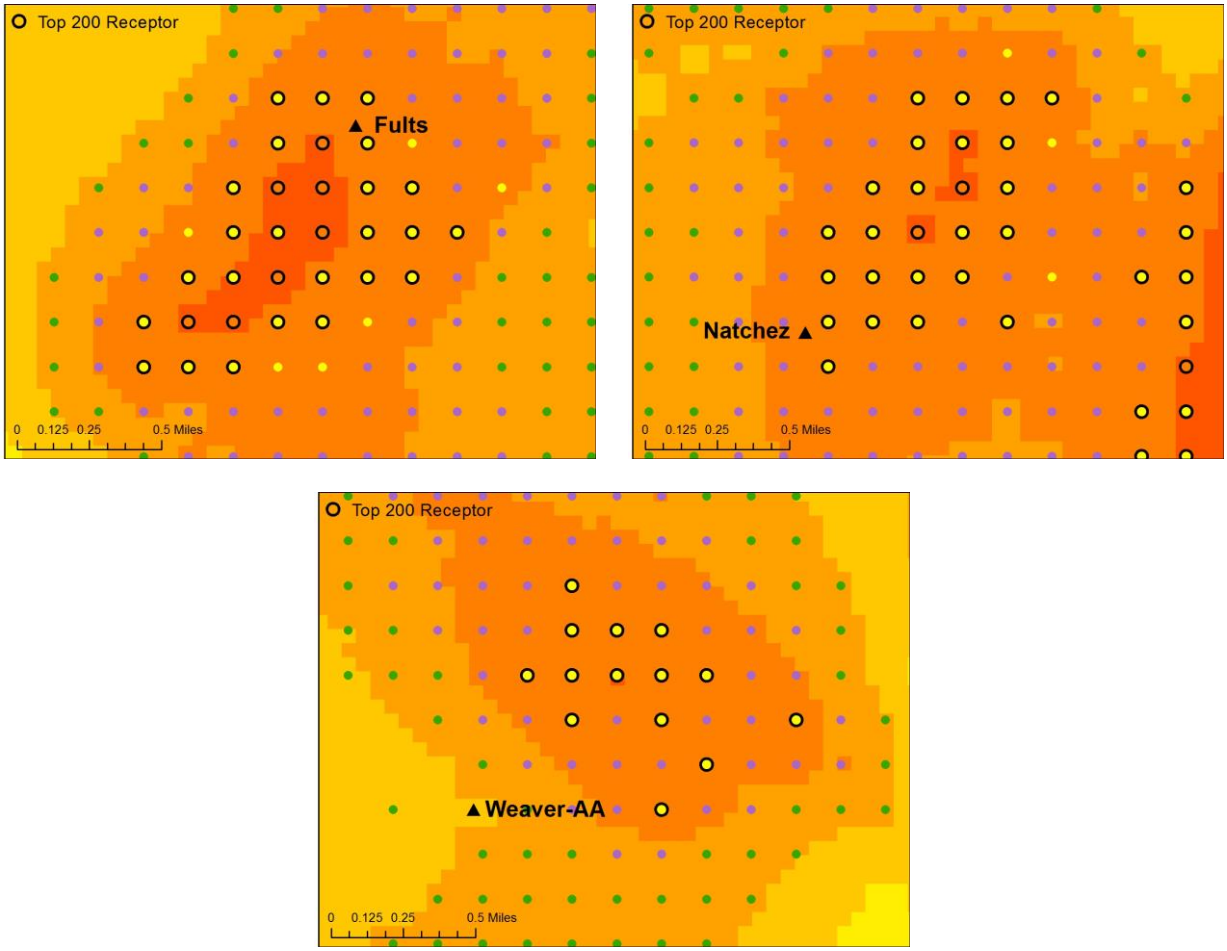

Figure 5. Modeled design values, receptors with design values ≥75 percent of the maximum modeled design value, and proposed monitoring station locations.

surrounding its current location generally have modeled design values equal to 85-90 percent of the maximum modeled design value). The entire area is floodplain/agricultural and Ivy Road, oriented northeast-southwest, runs through the middle of it, making the proposed optimized location as accessible as Ameren's proposed location and equally easy to provide power to.

Natchez – The Natchez monitoring station is outside/on the outer edge of an area where peak 1-hour SO_2 concentrations are expected to occur. Moving it approximately one kilometer northeast of its current location would move it from an area with modeled design values in the 120-130 ug/m^3 range to an area with modeled design values in the 130-140 ug/m^3 range, and place it between a pair of receptors with modeled design values equal to 90-95 percent of the maximum modeled design value (the receptors surrounding its current location have modeled design values equal to 80-90 percent of the maximum modeled design value). It would also move it to an area where higher concentrations are expected to occur with slightly greater frequency. The proposed optimized location is accessible via transmission right of way, and power is available along Dubois Creek Road to the south-southwest.

Weaver-AA – The Weaver-AA station is located completely outside of all areas where peak 1-hour SO2 concentrations are expected to occur. Modeled design values at its location are only in the 100-110 ug/m^3 range, and it is surrounded by receptors with modeled design values equal to just over 75 percent of the maximum modeled design value. Moving the monitor just over one kilometer east-northeast of its current location would place it in an area where modeled design values are 15-20 ug/m^3 higher, in the midst of a slightly dispersed group of receptors with modeled design values equal to 85-90 percent of the maximum modeled design value. At this optimized location, concentrations in excess of 75 percent of the maximum modeled design value are expected to occur roughly twice as often as at Ameren's proposed Weaver-AA location. The proposed optimized location is readily accessible via State Highway AA, and power is available along the highway.

Figure 6 compares the locations of Ameren's proposed Fults, Natchez, and Weaver-AA monitoring stations with optimized locations more likely to record maximum SO_2 concentrations in the area.

II. The Modeling Described in the Report Does Not Comport With EPA's Source-Oriented SO_2 Monitoring Guidance and Therefore May Not Correctly Identify Areas of Expected Ambient, Ground-Level SO_2 Concentration Maxima

EPA's SO_2 NAAQS Designations Source-Oriented Monitoring Technical Assistance Document (TAD) provides guidance on how to "appropriately and sufficiently monitor ambient air in areas proximate to or impacted by an SO_2 emissions source to create ambient monitoring data for comparison to the SO_2 NAAQS" and presents "recommended steps to aid in identifying source-oriented SO_2 monitor sites."[1] The modeling performed to determine the locations of the proposed ambient SO_2 monitoring stations around the Rush Island Energy Center fails to adhere to the TAD in two important respects: 1) it does not use hourly emission rates, which are readily available for Rush Island's boilers from EPA's online Air Markets Program Data tool; and 2) it does not include nearby sources that may contribute significantly to ambient SO_2 concentrations in the vicinity of the plant and therefore should be included in the modeling.

EPA suggests using hourly emissions when available in order to represent the variability of actual emissions as accurately as possible,[2] which is important given the short-term nature of the SO_2 NAAQS. However, instead of using readily-available hourly emissions as recommended by EPA's monitoring TAD, Ameren's modeling uses constant emission rates for Rush Island's boilers. The consequence of using constant rather than hourly emission rates is that the effects of the interaction between hourly emissions and hourly variations in meteorological parameters are not captured by the model, so that the predicted areas of peak concentration are primarily a function of the meteorology used. For example, if peak hourly emissions coincide with times when strong winds blow from a direction other than the prevailing wind direction, a model that uses hourly emission rates might predict peak concentrations in different areas than the same

[1] U.S. EPA, SO_2 NAAQS Designations Source-Oriented Monitoring Technical Assistance Document, Dec. 2013 Draft, at 2, available at http://epa.gov/airquality/sulfurdioxide/pdfs/SO2MonitoringTAD.pdf.
[2] *Id*. at 11, referencing U.S. EPA, SO_2 NAAQS Designations Modeling Technical Assistance Document, Dec. 2013 Draft, at 10, available at http://epa.gov/airquality/sulfurdioxide/pdfs/SO2ModelingTAD.pdf.

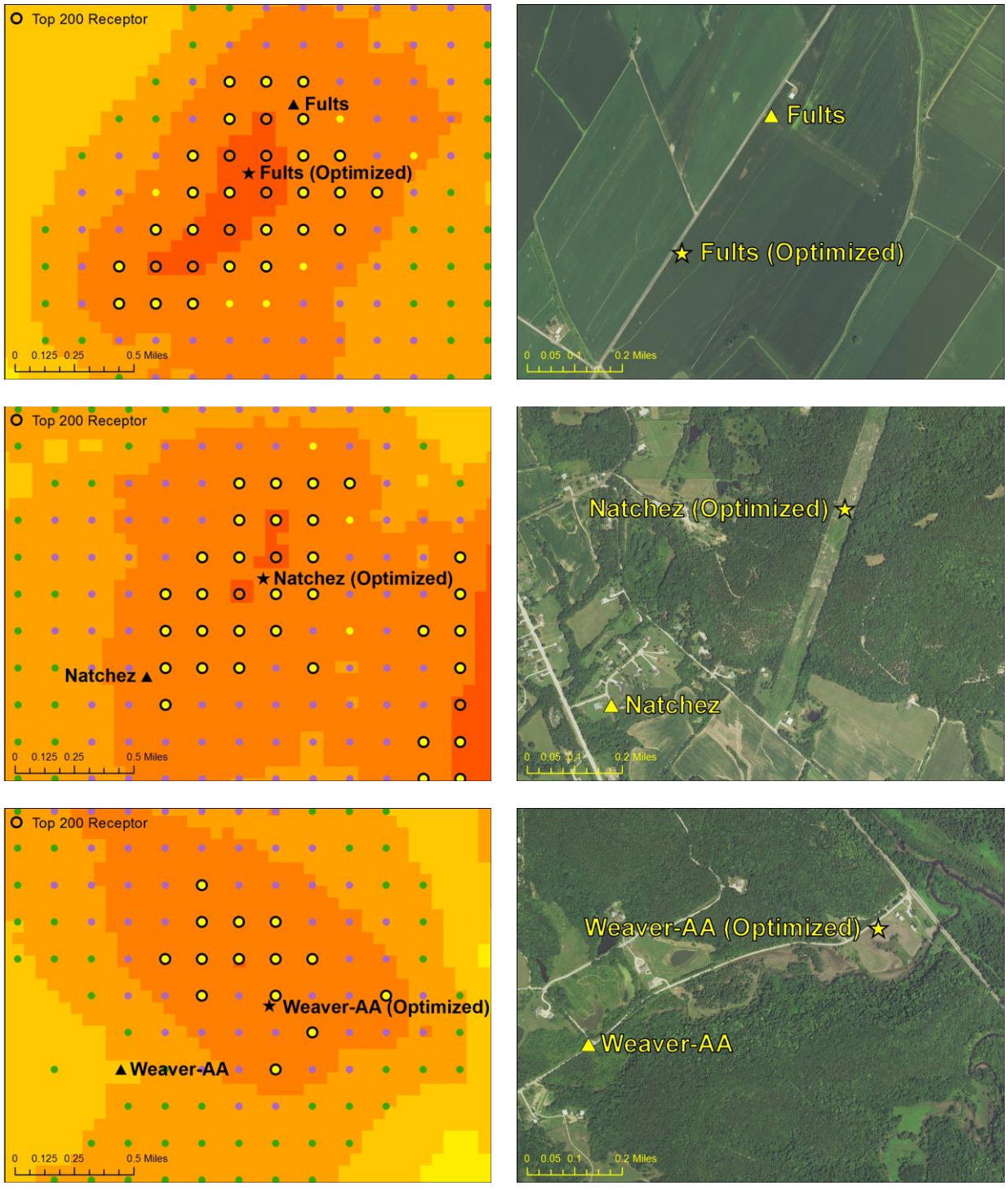

Figure 6. Current and optimized locations of the Fults, Natchez, and Weaver-AA monitoring stations

model would predict using constant emission rates. Therefore, using hourly emissions allows the areas where peak 1-hour SO_2 concentrations are expected to occur to be determined with greater confidence.

Regarding which sources to model, EPA suggests identifying and including all sources that may contribute significantly to ambient SO_2 concentrations – and thus to NAAQS exceedances – around the source of interest. The monitoring TAD notes that it is important to "understand the setting and surroundings of the SO_2 source" including determining "if the source is isolated or in an area with multiple SO_2 sources," and it affirms that the primary objective of monitoring is "to identify peak SO_2 concentrations in the ambient air that are attributable to an identified source *or group of sources.*"[3] The Rush Island Energy Center is located in an SO_2 nonattainment area with numerous sources of varying magnitude. There are also a number of larger sources that are nearby but just outside of the nonattainment area, including River Cement, St. Gobain Containers, Holcim, Mississippi Lime, Dynegy's Baldwin Energy Complex, and Ameren's Meramec Energy Center. These sources may contribute significantly to ambient SO_2 concentrations in the vicinity of the Rush Island plant and should be included in the modeling unless it can be demonstrated that they do not have a significant influence on areas where peak 1-hour SO_2 concentrations are expected to occur.

III. The Meteorological Data Used in the Modeling May Not be Appropriate

Ameren's modeling uses National Weather Service (NWS) meteorological data from the Cahokia, Illinois airport located approximately 50 kilometers north of the plant. This is different from the meteorological data DNR used in its attainment demonstration modeling for the Jefferson County SO_2 nonattainment SIP. In its SIP modeling, DNR used onsite meteorological data from the now-closed Doe Run primary lead smelter in Herculaneum, approximately 18 kilometers northwest of the Rush Island plant. The Rush Island Energy Center is in the Jefferson County SO_2 nonattainment area, and the Jefferson County SIP states that the onsite meteorological data from Herculaneum is "considered more representative of the entire [nonattainment] area compared to a more distant NWS site."[4] Therefore, the Cahokia meteorological data used in Ameren's modeling may not be appropriate, particularly if – as suggested above – other nearby SO_2 sources are included in the modeling, given that DNR determined – based on the distribution of these sources – that the onsite Herculaneum meteorological data is more representative of the area that encompasses them.

Conclusion

Based on the modeling described in Ameren's report, the proposed locations of the Fults, Natchez, and Weaver-AA monitoring stations are not in modeled peak concentration/high frequency areas. Furthermore, Ameren has not proposed a monitoring station in the highest concentration area due south of the Rush Island Energy Center, citing the claimed but not

[3] *Id*. at 2, 4 (emphasis added).

[4] DNR, Nonattainment Plan for the 2010 1-Hour Sulfur Dioxide National Ambient Air Quality Standard, Jefferson County Sulfur Dioxide Nonattainment Area, May 28, 2015, at 26.

documented inaccessibility of potential monitoring sites in that area. The absence of a monitor in this large area of expected maximum concentration calls into question whether the proposed SO_2 monitoring network is an appropriate means of assessing compliance with the NAAQS in the area around the plant.

Ameren's proposed monitoring network does not fulfill its requirement under the Consent Agreement to install a monitoring network designed to record maximum expected SO_2 concentrations in the vicinity of the Rush Island plant. Nor is it designed to achieve Ameren's purported goal of obtaining "a good quality data set with representative SO_2 measurements and meteorological information"[5] or DNR's stated goal "to true-up modeling results further away from the Mott Street monitor … to confirm our assessment that the nonattainment area is in compliance with the 1-hour SO2 standard farther away from the violating monitor."[6]

We urge DNR to reject the proposed monitoring sites and require Ameren to add a monitoring station in the highest concentration area due south of the plant as well as to relocate the proposed Fults, Natchez, and Weaver-AA monitoring stations to the optimized locations shown in Figure 5. We also urge DNR to require Ameren to 1) rerun the air dispersion model described in the report using Rush Island's actual hourly emissions; 2) evaluate the effects of nearby interactive sources (including, at a minimum, River Cement, St. Gobain Containers, Holcim, Mississippi Lime, Dynegy's Baldwin Energy Complex, and Ameren's Meramec Energy Center) on modeled peak concentration/high frequency areas; and 3) evaluate the appropriateness of using meteorological data from the Cahokia, Illinois airport instead of Doe Run Herculaneum given DNR's determination that the latter is more representative of the modeled area.[7] We further urge DNR to require any necessary adjustments to the proposed monitoring network based on the results of these analyses.

Respectfully submitted,

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On behalf of the Sierra Club

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[5] DNR, Comments and Responses on Proposed Revision to Missouri State Implementation Plan – Nonattainment Plan for the 2010 1-Hour Sulfur Dioxide National Ambient Air Quality Standard – Jefferson County Sulfur Dioxide Nonattainment Area, Comment #21, p. 10, available at http://dnr.mo.gov/env/apcp/docs/comments-and-responses-jeffco.pdf.

[6] *Id*., Response to Comment #4, p. 3.

[7] This analysis should consider and make use of the corrected Herculaneum meteorological data set processed in AERMET with the Bulk Richardson Number option invoked.

Cc: Rebecca Weber, Director, Air & Waste Management Division, EPA Region 7
Josh Tapp, Chief, Air Planning & Development Branch, EPA Region 7
Kyra Moore, Director, Air Pollution Control Program, DNR
Wendy Vit, Chief, Air Quality Planning Section, Air Pollution Control Program, DNR